

respective positions of said one or more entity type records.

68. (new) A relational database comprising:

one or more relation type records at respective positions within a memory of a computer; and

means for adding a new relation type record to said relational database in a manner so as to preserve said respective positions of said one or more relation type records.

REMARKS

Claims 1-22 are canceled without prejudice by this Amendment. Claims 23-68 are added by this Amendment. Therefore, Claims 23-68 are at issue.

Support of the Amendments

The Specification is amended to correct several obvious and inadvertent clerical errors.

Claim 23 is supported by Figs. 5-7 and by the Specification at page 39, lines 12-22 and at page 49, lines 9-26.

Claim 24 is supported by Fig. 5.

Claims 25 and 26 are supported by Fig. 6A.

Claim 27 is supported by the Specification at page 38, lines 20-25 and at page 36, lines 29-37.

Claim 28 is supported by the Specification at page 38, lines 25-27 and at page 36, lines 29-37.

Claims 29 and 30 are supported by the Specification at page 32, lines 1-14 and at page 40, lines 23-25.

Claims 31 and 32 are supported by the Specification at page 32, lines 15-33 and at page 40, lines 25-29.

Claim 33 is supported by Fig. 7 and by the Specification at page 41, lines 10-28.

Claims 34-38 are supported by the Specification at page 41, line 29, to page 43, line 7.

Claim 39 is supported by Fig. 5 and by the Specification at page 36, lines 12-19.

Claim 40 is supported by Figs. 5-7 and by the Specification at page 39, lines 4-12 and at page 49, lines 9-26.

Claims 41-43 are supported by Figs. 5-9 and by the Specification at page 56, line 9 to page 58, line 6.

Claims 44 and 45 are supported by Figs. 5-7 and by the Specification at page 39, lines 12-22 and at page 49, lines 9-26.

Claim 46 is supported by Fig. 5.

Claim 47 is supported by Fig. 6A.

Claims 48 and 49 are supported by the Specification at page 38, lines 20-27 and at page 36, lines 20, to page 37, line 5.

Claim 50 is supported by the Specification at page 38, lines 8-19 and Figure 6A.

Claim 51 is supported by the Specification at page 40, lines 23-29.

Claims 52 and 53 are supported by Figs. 5-7 and by the Specification at page 39, lines 4-12 and at page 49, lines 9-26.

Claim 54 is supported by Figure 6A.

Claims 55 and 56 are supported by the Specification at page 38, lines 20-27 and at page 36, lines 20, to page 37, line 5.

Claim 57 is supported by the Specification at page 38, lines 8-19 and Figure 6A.

Claim 58 is supported by the Specification at page 40, lines 23-29.

Claims 59-66 are supported by Figs. 5-9 and by the Specification at page 56, line 9 to page 58, line 6.

Claims 67 and 68 are supported by Figs. 5-7 and by the Specification at page 39, lines 4-22 and at page 49, lines 9-26.

No new matter is added by this amendment.

The Claims Recite Patentable Subject Matter

The Examiner rejected Claims 14-20 and 22 "under 35 U.S.C. § 101 because they are directed to non-statutory subject matter." Claims 14-20 and 22 are canceled without prejudice by this Amendment. Therefore, the Examiner's rejection under § 101 is rendered moot. However, Applicant notes that the Examiner's rejection under § 101 pertained solely to those Claims reciting a method. Applicant will therefore discuss the statutory nature of the method claims added by this Amendment.

New independent Claims 44, 52, and 59 recite "a method for processing data in a computer", "a method for processing data in a computer" and "a method for retrieving information stored in . . . a computer", respectively. The Examiner acknowledges that claims "directed to a computer implemented process, i.e. to a series of steps performed by a computer" are statutory subject matter within the meaning of § 101. Each of Claims 44, 52 and 59 recite steps which manipulate a component of a computer, namely a memory means. For example, Claims 44 and 52 recite several steps of "storing within said memory means. . . ." Additionally, Claim 59 recites the steps "forming within said memory means an inquiry definition table", "storing said . . . record in said . . . table" and "retrieving

from said memory means. . . ." Thus, Claims 44, 52 and 59 recite steps performed by a computer and therefore recite statutory subject matter as directed to a computer implemented process.

The Claims Are Properly Supported by the Specification

The Examiner rejected Claims 1-22 under 35 U.S.C. § 112, citing numerous deficiencies in form. Claims 1-22 are canceled without prejudice by this Amendment rendering the Examiner's objects moot. Claims 23-68 added by this Amendment do not include language to which the Examiner has objected in Claims 1-22. Therefore, the Examiner's objections with respect to Claims 1-22 do not pertain to Claims 23-68.

The Claims Are Allowable Over the Cited Art

The Examiner rejected Claims 1-22 "under 35 U.S.C. § 103 as being unpatentable over Shimaoka et al." Claims 1-22 are canceled without prejudice by this Amendment and are replaced by new Claims 23-68. Therefore, new Claims 23-68 are discussed with reference to Shimaoka et al.

Shimaoka et al. disclose a data management system for managing data in a computer system comprising an item information file, a relation information file and a relation table. Item information records (see Shimaoka et al.'s Figures 4A-4D) are related to one another by relations recorded in relation information records (see Shimaoka et al.'s Figures 5A-5D). Relations between various source items and object items are defined by a relations table (Shimaoka et al.'s Figure 6). Shimaoka et al.'s relation table is a two-dimensional table in which two complete sets of two-character item codes form the two axes. Several of the cells of the two-dimensional table contain two-character codes representing the relationship

between the two items represented by the item codes of each of the axes defining the cell occupied by the relationship code.

Applicant's Claim 23 recites "means . . . for adding to said table a new entity type record in a manner so as to preserve said corresponding positions within said table of said one or more entity type records." Shimaoka et al. teaches a two-dimensional table in which two complete sets of two-character item codes form the two axes. Shimaoka et al. teach no other collection of data defining the items to which item information records may belong. Thus, to add a new item to Shimaoka et al.'s relation table requires adding a new item code to each of the two axes of the relation table. Those skilled in the art understand that adding a new item code to each of the two axes of Shimaoka et al.'s relation table requires displacing within the memory means of the computer system containing the relation table a substantial number of the item codes which form the axes of the relation table. Thus, Shimaoka et al. does not anticipate Applicant's Claim 23.

Applicant's Specification teaches at page 49, lines 9-26, that one key achievement of the present invention is the extensibility of the structure of the data managed. The Specification further teaches at page 54, lines 11-21, that another key achievement is the tremendously improved speed of data access. As discussed at page 54, lines 11-21, in and throughout Applicant's Specification, speed is achieved through implementation of a relative table organization (RTO) in which records of the table are accessed by providing a location within the table at which the relevant records are to be found. Thus, a record of an RTO table is accessed with only one access of the table. Contrast key-sequence organized tables disclosed in conjunction with Applicant's Figure 2A.

If adding a record to an RTO table containing a number of records displaces any of those records, any references to any

displaced record which is not accordingly updated to reflect the new location of the displaced record is made incorrect. The presence of incorrect references in a relational database corrupts the database making the database inaccessible.

The relation table taught by Shimaoka et al. is clearly unsuitable for the purposes of Applicant's invention. Shimaoka et al.'s relation table does not permit a new item code to be added without displacing the location of other item codes. Shimaoka et al. do not suggest any table organization whereby the table is extensible while still facilitating the efficient accessibility of an RTO table. Therefore, Applicant's Claim 23 is non-obvious in view of Shimaoka et al.

As Claims 24-39 are dependent on Claim 23, Claims 24-39 are patentable over Shimaoka et al. for the same reasons as is Claim 23.

Claim 27, a claim dependent on Claim 23, further recites "said head type field identifies . . . said corresponding position within said table of said head type." Claim 28, also dependent on Claim 23, recites "said tail type field identifies . . . said corresponding position within said table of said tail type." Shimaoka et al. disclose a relation table in which source item codes and object item codes are identified by two-character identification strings. Shimaoka et al. do not disclose relation type data which identify head and tail entity types by specifying the relative location of said head and tail entity types in memory. Therefore, Claims 27 and 28 are patentable over Shimaoka et al. independent of the dependency of Claims 27 and 28 on independent Claim 23.

Claims 29 and 30, also dependent on Claim 23, recite relation type data further comprising cardinality data. Claims 31 and 32 recite relation type data further comprising mandatory coupling data. As discussed above, Shimaoka et al. disclose a relation table in which source item codes and object

item codes are identified by two-character identification strings. Shimaoka et al. do not disclose any data defining a type of relation other than a two-character abbreviation and a description string. Therefore, Claims 29-32 are patentable over Shimaoka et al. independent of the dependency of Claims 29-32 on independent Claim 23.

Claims 34 and 35 which depend on Claim 23 recite respectively head and tail instance fields identifying "the position of said selected entity, relative to [a known] position, within said memory means." Shimaoka et al. identify source data elements and object data elements in relation data elements by specifying a two-character code identifying the source item, a serial number identifying the source data element, a two-character code identifying the object item and a serial number identifying the object data element. Nowhere does Shimaoka et al. disclose the identification of specific instances of entity types by specifying the relative location of those entity instances within the memory means of a computer. Therefore, Claims 34 and 35 are patentable over Shimaoka et al. independent of the dependency of Claims 34 and 35 on independent Claim 23.

Claims 37 and 38, which are dependent on Claim 23, recite respectively head and tail type fields identifying "said corresponding position within said table of said" first or second entity type. As discussed above, Shimaoka et al. identify source items and object items in relation data elements by specifying a two-character code identifying the source item and a two-character code identifying the object item. Nowhere does Shimaoka et al. disclose the identification of specific items or entity types by specifying the relative location of those entity types within the memory means of a computer. Therefore, Claims 37 and 38 are patentable over

Shimaoka et al. independent of the dependency of Claims 37 and 38 on independent Claim 23.

Claim 44 recites a method for processing data in a computer comprising the step of "adding to said entity type table a new entity type record in a manner so as to preserve said corresponding positions within said entity type table of said one or more entity type records." Claim 44 is therefore patentable over Shimaoka et al. for the same reasons as is Claim 23. As Claims 45-51 are dependent on Claim 44, Claims 45-51 are patentable over Shimaoka et al. for the same reasons as is Claim 44.

Claims 48 and 49, while dependent on Claim 44, further recite that head and tail entity type data, respectively, identifies "said corresponding position within said entity type table of said" first or second entity type record. Therefore, independent of the dependency on Claim 44, Claims 48 and 49 are patentable over Shimaoka et al. for the same reasons given above with respect to Claims 34 and 35.

Claim 51, dependent on Claim 44, recites that "each said relation type record further comprises cardinality data." Claim 51 is therefore patentable over Shimaoka et al. for the reasons given above with respect to Claims 29 and 30 independent of the dependency of Claim 51 on Claim 44.

Independent Claim 67 recites "means for adding a new entity type record to said relational database in a manner so as to preserve said respective positions of said one or more entity type records." Claim 67 is therefore patentable over Shimaoka et al. for the reasons given above with respect to Claims 23 and 44.

Claim 40 recites means "for adding to said table [of relation type records] a new relation type record in a manner so as to preserve said corresponding positions within said table of said one or more relation type records." As discussed



above, Shimaoka et al. teaches a two-dimensional table in which two complete sets of two-character item codes form the two axes. Each cell of the two-dimensional table contains or is capable of containing a single two-character relation code identifying the relation between the two items represented by the item codes of the axes defining the cell. Shimaoka et al. suggest that the relation table may be multi-dimensional. However, Shimaoka et al. do not disclose how multi-dimensionality is to be achieved. One skilled in the art would not know whether to add a third axis containing one of each of the various item codes thereby forming relation definitions between three items or to add a third scalar dimension thereby providing a fixed, arbitrary number of relations between any two item codes. Those skilled in the art understand that, under either adaptation to Shimaoka et al.'s relation table, adding a new relation definition requires displacing within the relation table a substantial number of the relation definition codes stored within the relation table. Thus, Shimaoka et al. does not anticipate Applicant's Claim 40.

As discussed above with respect to Applicant's Claim 23, Applicant teaches that one key achievement of the present invention is the extensibility of the structure of the data managed and that another key achievement is the tremendously improved speed of data access. As is also discussed above, speed is achieved through implementation of a relative table organization (RTO) in which records of the table are accessed by providing a location within the table at which the relevant records are to be found. If adding a record to an RTO table containing a number of records displaces any of those records, any references to any displaced record which is not accordingly updated to reflect the new location of the displaced record is made incorrect. The presence of incorrect references in a

relational database corrupts the database making the database inaccessible.

The relation table taught by Shimaoka et al. is clearly unsuitable for the purposes of Applicant's invention. Shimaoka et al.'s relation table does not permit the relation table to be expanded without displacing the location of relation codes. Shimaoka et al. do not suggest any table organization whereby the table is extensible while still facilitating the efficient accessibility of an RTO table. Therefore, Applicant's Claim 40 is non-obvious in view of Shimaoka et al.

Claim 52 recites a method for processing data in a computer comprising the step of "adding to said relation type table a new relation type record in a manner so as to preserve said corresponding positions within said relation type table of said one or more relation type records." Claim 52 is therefore patentable over Shimaoka et al. for the same reasons as is Claim 40. As Claims 53-58 are dependent on Claim 52, Claims 53-58 are patentable over Shimaoka et al. for the same reasons as is Claim 52.

Claims 55 and 56, while dependent on Claim 52, further recite that head and tail entity type fields, respectively, identify "said corresponding position within said entity type table of said [first or second] of said plurality of entity type records." Therefore, independent of the dependency on Claim 52, Claims 55 and 56 are patentable over Shimaoka et al. for the same reasons given above with respect to Claims 34, 35, 48 and 49.

Claim 58, dependent on Claim 52, recites that "each said relation type record further comprises cardinality data." Claim 58 is therefore patentable over Shimaoka et al. for the reasons given above with respect to Claims 29, 30 and 51 independent of the dependency of Claim 58 on Claim 52.

Independent Claim 68 recites "means for adding a new relation type record to said relational database in a manner so as to preserve said respective positions of said one or more relation type records." Claim 68 is therefore patentable over Shimaoka et al. for the reasons given above with respect to Claims 40 and 52.

Applicant's independent Claim 41 recites an information retrieval system comprising "a relational database", "lookup means . . .", and "means for storing . . . one or more sequential sets of one or more search paths" wherein one or more entity instances specified by said one or more sets of one or more search paths are stored in a table means. Shimaoka et al. disclose a information retrieval process by which a single search path is specified (Shimaoka et al.'s step S40 in Figure 9A). Nothing in Shimaoka et al. discloses a "means for storing . . . one or more sequential sets of one or more search paths" or "means . . . for storing one or more resulting desired entity instances in [a] table means" or the combining of "one or more entity instances stored in said table means with said relation instance of each and every search path of said given set to form a cross-correlated set of new search paths." In short, Shimaoka et al. disclose a simple means for obtaining from a single search path information specified by that single search path. Nothing in Shimaoka et al. discloses the apparatus of Applicant's Claim 41 which is capable of obtaining information specified by several sets of search paths, each set comprising several search paths. Therefore, Applicant's Claim 41 is not anticipated by Shimaoka et al.

Nothing in Shimaoka et al. evidences an appreciation of the need to define and store complicated inquiry definitions representing several sets of several search paths to each set. Therefore, Applicant's Claim 41 is non-obvious in view of Shimaoka et al.

Applicant's Claim 42 recites an information retrieval system comprising "a relational database", "recursive lookup means . . ." comprising "results table means", "path definition means" and "singular lookup means". As discussed above, Shimaoka et al. disclose a simple means for obtaining from a single search path information defined by that single search path. Nothing in Shimaoka et al. discloses the apparatus of Applicant's Claim 42 which is capable of obtaining information defined by several sets of search paths, each set comprising several search paths. Therefore, Applicant's Claim 42 is not anticipated by Shimaoka et al.

As discussed above with respect to Applicant's Claim 41, nothing in Shimaoka et al. evidences an appreciation of the need to define and store complicated inquiry definitions representing several sets of several search paths to each set. Therefore, Applicant's Claim 42 is non-obvious in view of Shimaoka et al.

Applicants Claim 43 is dependent on Claim 42 and is therefore patentable over Shimaoka et al. for at least the same reasons as is Claim 42.

Applicant's Claim 59 recites a method for retrieving information stored in a relational database comprising the steps of "forming . . . an inquiry definition table", "forming a search path definition record", "storing said search path definition record in said inquiry definition table." Shimaoka et al. do not disclose the forming of and storage of search path definition records in a table. Therefore, Applicant's Claim 59 is not anticipated by Shimaoka et al.

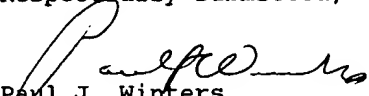
As discussed above, Shimaoka et al. do not teach the processing of complex inquiries comprising multiple parallel search paths and search paths involving a series of sequential database accesses. Instead, Shimaoka et al. disclose a process for obtaining information specified by a single search path.

Therefore, Shimaoka et al. evidence no appreciation for the need to store in the memory of a computer system a complex inquiry definition. Thus, Applicant's Claim 59 is non-obvious in view of Shimaoka et al.


Applicant's Claims 60-66 are dependent on Claim 59 and are therefore patentable over Shimaoka et al. for the same reasons as is Claim 59.

Therefore, Applicant's Claims 23-68 are in condition for allowance. Accordingly, allowance of Applicant's Claims 23-68 is respectfully requested. If the Examiner's next action is other than entry of this amendment and allowance of all pending claims, the Examiner is requested to telephone Applicant's attorney at (408) 283-1222.

Respectfully submitted,

  
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Date of Signature Attorney for Applicant